

# Authors' affiliations

**D J Armstrong, S A Wright, M B Finch**, Department of Rheumatology, Musgrave Park Hospital, Belfast, UK

**S M Coward**, Department of Biochemistry, Musgrave Park Hospital, Belfast, UK

Correspondence to: Dr D J Armstrong, Department of Rheumatology, Musgrave Park Hospital, Stockman's Lane, Belfast, Northern Ireland, UK; oswald17727@hotmail.com

Accepted 4 November 2005

# REFERENCES

- 1 **Sneider LC, Mesa ML.** Differences between florid osseous dysplasia and chronic diffuse sclerosing osteomyelitis. *Oral Surg Oral Med Oral Pathol* 1990;**70**:308–12.
- 2 **Fery A.** Chronic sclerosing osteomyelitis: the value of intramedullary reaming. *J Chir Paris* 1990;**127**:157–63.
- 3 **Roldan JC, Terheyden H, Dunsche A, Kampen WU, Schroeder JO.** Acne with chronic recurrent multifocal osteomyelitis involving the mandible as part of the SAPHO syndrome: case report. *Br J Oral Maxillofac Surg* 2001;**39**:141–4.
- 4 **Iqbal M, Kolodney MS.** Acne fulminans with synovitis-acne-pustulosis-hyperostosis-osteitis (SAPHO) syndrome treated with infliximab. *J Am Acad Dermatol* 2005;**52**:S118–20.
- 5 **Jones J, Amess TR, Robinson PD.** Treatment of chronic sclerosing osteomyelitis of the mandible with calcitonin: a report of two cases. *Br J Oral Maxillofac Surg* 2005;**43**:173–6.
- 6 **Amital H, Applbaum YH, Amar S, Daniel N, Rubinov A.** SAPHO syndrome treated with pamidronate: an open-label study of 10 patients. *Rheumatology (Oxford)* 2004;**43**:6658–64.
- 7 **Wright SA, Millar AM, Coward SM, Finch MB.** Chronic diffuse sclerosing osteomyelitis treated with risedronate. *J Rheumatol* 2005;**32**:1376–8.
- 8 **Sugata T, Fujita Y, Myoken Y, Kiriya T.** Successful management of severe facial pain in patients with diffuse sclerosing osteomyelitis (DSO) of the mandible using disodium clodronate. *Int J Maxillofac Surg* 2003;**32**:574–5.
- 9 **Hughes DE, Wright KR, Uy HL.** Bisphosphonates promote apoptosis in murine osteoclasts. *J Bone Miner Res* 1995;**10**:1478–87.
- 10 **Rodan GA, Fleisch HA.** Bisphosphonates: mechanisms of action. *J Clin Invest* 1996;**97**:2692–6.

# Ultrasound ability in early diagnosis of stress fracture of metatarsal bone

**F Banal, F Etchepare, B Rouhier, C Rosenberg, V Foltz, S Rozenberg, A C Koeger, B Fautrel, P Bourgeois**

*Ann Rheum Dis* 2006;**65**:977–978. doi: 10.1136/ard.2005.046979

A 42 year old woman, with rheumatoid arthritis for 14 years, treated with leflunomide 20 mg/day and prednisolone 5 mg/day, had mechanical pain over the dorsum of the right foot for 3 weeks. She had increased her walking activities a couple of weeks before the pain started. On clinical examination, there was a marked swelling and painful area on the second metatarsal. Plain radiographs were normal.

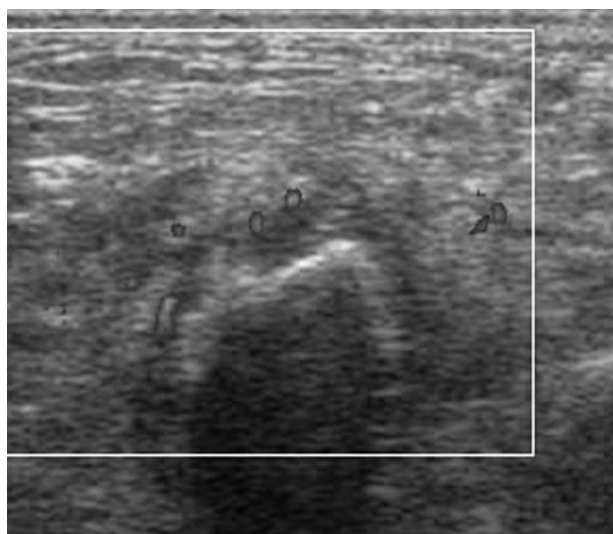
Sonography of the foot was obtained with a Esaote MP system and a 7.5–13 MHz linear transducer. Only the dorsal aspect of the foot was required in a longitudinal and axial view. A hypoechoic haematoma with periosteal elevation and

cortical break was seen over the second metatarsal, which corresponded to the pain area (figs 1 and 2). Vascularity was showed on power Doppler mode in the periosteal elevation.

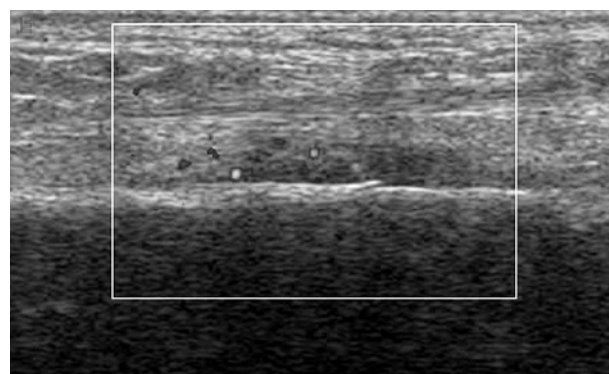
Magnetic resonance imaging (MRI) of the foot was performed a week later (figs 3–5). It confirmed the initial diagnosis, showing a soft tissue oedema, callus, and continuity break in the bone.

A plain radiograph, 6 weeks after the first one, showed a callus corresponding exactly to the area of periosteal elevation seen on sonography and MRI.

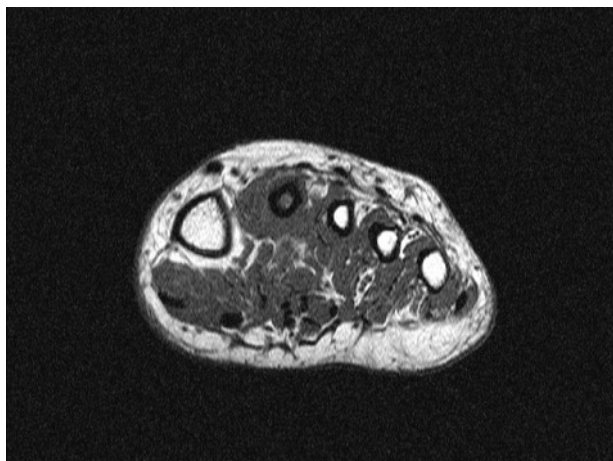
Plain radiographs may be normal for several weeks before a callus or a fracture line appears in the case of stress fractures. Early diagnosis in this case depends on MRI or bone scan scintigraphy, which are considered to be the “gold standard”.<sup>1</sup> This observation illustrated the diagnostic ability of ultrasound in the early stage of a stress fracture and another use of ultrasound in rheumatology.



**Figure 1** An axial ultrasound image of the second metatarsal bone showed distinct cortical thickening with periosteal haematoma and power Doppler signal.



**Figure 2** A longitudinal ultrasound image of the second metatarsal bone showed distinct cortical thickening with periosteal haematoma and power Doppler signal.



**Figure 3** An axial T<sub>1</sub> MRI demonstration of a stress fracture of the second metatarsal bone demonstrating extensive medullary high signal and cortical thickening with soft tissue oedema.



**Figure 4** A coronal T<sub>1</sub> MRI demonstration of a stress fracture of the second metatarsal bone demonstrating extensive medullary high signal and cortical thickening with soft tissue oedema.

To the best of our knowledge, only two authors have reported such a case of ultrasound diagnosis of metatarsal stress fracture. Firstly, Howard, described only a small periosteal elevation in the area of a second metatarsal stress fracture, without any other detail, no doubt owing to an old generation sonography system.<sup>2</sup> In a recent series of five



**Figure 5** A coronal STIR MRI demonstration of a stress fracture of the second metatarsal bone demonstrating extensive medullary high signal and cortical thickening with soft tissue oedema.

metatarsal stress fractures, Bodner found other sonographic features, as in our case: small fluid collection, soft tissue oedema, and colour Doppler sonography rich vascularity surrounding the fracture area.<sup>3</sup> All those sonographic findings correlated well with MRI.

Low cost, non-invasive, fast to perform, and easy access, ultrasound is the preferred method and may in the future usefully replace MRI and bone scintigraphy in the early diagnosis of stress fracture of superficial bones. Further studies are needed to demonstrate this.

#### Authors' affiliations

F Banal, F Etchepare, B Rouhier, C Rosenberg, V Foltz, S Rozenberg, A C Koeger, B Fautrel, P Bourgeois, Service Rhumatologie Groupe, Hôpitalier Pitié Salpêtrière, 47/83, boulevard de l'Hôpital, 75651 Paris, Cedex 13, France

Correspondence to: Dr F Banal, frederic.banal@neuf.fr

Accepted 3 November 2005

#### REFERENCES

- 1 Ishibashi Y. Comparison of scintigraphy and magnetic resonance imaging for stress injuries of bone. *Clin J Sport Med* 2002;**12**:79–84.
- 2 Howard CB. Stress fracture detected sonographically. *AJR Am J Roentgenol* 1992;**159**:1350–1.
- 3 Bodner G. Sonographic findings in stress fractures of the lower limb: preliminary findings. *Eur Radiol* 2005;**15**:2525–8.